HAEMATOLOGICAL AND BIOCHEMICAL CHARACTERISTICS OF FINISHER BROILER BIRDS FED HIGH LEVELS OF LEMON GRASS LEAF MEAL

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ABSTRACT
The research was carried out to determine the effect of high levels of lemon grass leaf meal on the haematological and biochemical characteristics of finisher broiler birds. A total number of ninety six, four weeks old. "Agric-tech" broiler birds were randomly distributed into four dietary treatments, each replicated three times with eight birds per replicate in a completely randomized design (CRD). Four diets were formulated such that the lemon grass leaf meal was incorporated into the diets at the rate of 1.25%, 2.50% and 3.75% respectively, while treatment 1 served as the control with 0% level of lemon grass leaf meal. Feed and water were given *ad-libitum* throughout the experimental period of twenty eight days. Proximate analysis of the lemon grass leaf meal and the experimental diets were carried out accordingly. The values obtained for haematological indices namely, packed cell volume, haemoglobin, red blood cell and white blood cell were all significantly ($p<0.05$) influenced by the lemon grass leaf mean across the treatment groups. Also the results of the biochemical indices revealed that the data obtained for total protein, albumin, creatinine and urea differed ($p<0.05$) across the treatment groups. Thus all values obtained were within the recommended range of values for normal broiler birds. It can however be concluded that the inclusion of high level of lemon grass leaf meal in the diet of broiler finisher had significant ($p<0.05$) effect on the birds blood profile.
Keywords: Haematological indices, biochemical indices, finisher broiler birds, high levels, lemon grass leaf meal.

INTRODUCTION
Blood plays an important role in the transportation of nutrients, metabolic waste products and gases around the body. Moreover, blood represents a means of assessing clinical and nutritional health status of animals (Olorode and Longe 2000). The haemato-biochemical profiles are most commonly used in nutritional studies for chickens and other birds like pigeon, guinea fowl, bronze turkey and Japanese quail (Arora 2010). The full blood count examines mostly the cellular components of blood whereas biochemical testing focuses on its chemical constituents (Hrubec *et al.* 2002). It has been shown that data from blood profiles could be exploited in the improvement of chicken stocks (Ladokun *et al.* 2008). In addition, blood parameters help diagnoses of specific poultry hen pathologies and might serve as basic knowledge for studies in immunology and comparative avian pathology (Bonadiman *et al*., 2009).
Lemon grass (*Cymbopogon citrates*) is a plant of importance because of the rich composition of phyto-chemicals like tannins, flavonoids and phenols (Olorunisola *et al*., 2014). Traditionally, tea made from *Cymbopogon citrates* leaves are popular in South America, Asia and West Africa for its antiseptic, anti-fever, anti-dyspeptic, carminative, anti-inflammatory, antipyretic and diuretic properties (Negrelle and Gomes, 2007). It is also an aromatic perennial tropical plant that can grow as high as 3.5 meters with long thin leaves. The grass was originally found growing wild in India. It produces a network of roots and rootless that rapidly exhausts the soil. In human medicine, lemon grass has the following therapeutic properties; analgestic, anti-depressant, antimicrobial, bactericidal, fungicidal and insecticidal. With all these remedies credited to lemon grass, it is believed that some of these advantages can be harnessed and brought to bear generally in livestock production and particularly in broiler production to enhance growth and the overall production performance and thus replace the antibiotic growth promoters. It is also a C4 tropical and sub-tropical grass.

MATERIALS AND METHOD
The experiment was conducted at the poultry unit of the Animal Production Department, Federal College of Agriculture, Ishiagu, Ebonyi State. The lemon grass leaf that was use for the experiment

was sourced from Afikpo and Ishiagu, both in Ebonyi state. The lemon grass leaves were obtained fresh and washed, then air-dried for a week at room temperature after which it was sun-dried for about 2 hours to get a cripsy-like leafy material. The cripsy leaves was then turned to leaf meal by means of grinding. Ninety six, 4 weeks old broiler birds were used for the research work; they were randomly distributed into four treatments. Each treatment was replicated three times in a completely randomized design (CRD) with eight (8) birds per replicate. The birds were purchased from a reputable farm in Enugu, Enugu state.

The birds were raised on a deep litter system with wood shavings which served as a source of litter. The initial weight of the birds was obtained after distribution to their various pens. Feed and water were given *ad-libitum*. All the routine vaccination and medication necessary for the birds' good health during the entire growth cycle from day one to the end of the experiment were strictly adhered to accordingly.

Experimental diets

Four experimental diets were formulated with diet 1 containing 0% lemon grass leaf meal which served as the control. Diets 2, 3 and 4 contain the lemon grass leaf meal at the levels of 1.25%, 2.50% and 3.75% respectively.

Table 1. Composition of finisher broiler birds diet fed supplemental levels of lemon grass leaf meal Treatments

Ingredients	T1	T2	T3	T4
Wheat offal	6.90	6.45	6.00	5.65
Groundnut cake	10.00	9.55	9.10	8.75
Palm kernel cake	6.50	6.15	5.80	5.25
Lemon grass leaf meal	0.00	1.25	2.50	3.75
TOTAL	**100**	**100**	**100**	**100**

Other feed ingredient had same value across treatment group: Maize- 58.00; Soybean meal-2.00;Full fat soya- 7.00;Fishmeal- 1.00; Blood meal-3.50; Bonemeal-2.50; Limestone-1.50; Salt-0.25; Finisher premix-0.35; Lysine-0.20; Methionine-0.30.

Feed intake was recorded as the difference between the quantity of feed given the previous day and the quantity that was left the next day. Feed conversion ratio was obtained as the ratio of feed intake divided by the body weight gain. Data collected were subjected to analysis of variance (ANOVA) and significant difference mean were separated according to the method of Duncan multiple range test as outlined by Obi (2002).

RESULTS AND DISCUSSION

The result of the haematological and serum biochemical characteristics of finisher broiler birds fed high level of lemon grass leaf meal is obtained in Table 2. The results showed that there was significant ($p<0.05$) difference among the haematological values across the treatment group. Birds in treatment 2 had the highest ($p<0.05$) value of 36.77% for packed cell volume, while the lowest value of 34.61% was obtained for birds in treatment 1 (control). The result revealed that there was an increase in the value of packed cell volume in the treatments where the lemon grass leaf meal was added. Values obtained were within the recommended normal range of 25% to 45% as outlined by Banerjee (2003). This confirms the assertion of Banerjee (2010) who reported that reduction in the level of packed cell volume below the normal range is an indication of the presence of a toxic factor

Birds in treatment 3 had the superior ($p<0.05$) value of 10.91g/l of haemoglobin which did not differ ($p>0.05$) from the value of 10.88g/l obtained for birds in treatment 2. Birds in control had the least value of 8.89g/l for haemoglobin. Values obtained in this study were within the recommended range of 7 to 12g/l as reported by Merck Manual (2012). This suggests that the quality of protein in the diet of the birds was good enough to contribute to a positive state of the bird's haemoglobin level.

The results obtained for serum biochemical characteristics also showed significant ($p<0.05$) differences among the parameters studied across the treatment group. Birds in treatment 3 had the highest value of 3.89g/dl which was similar ($p>0.05$) to the value obtained for birds in treatment 2 with a value of 3.85g/dl. Treatment 4 had a value of 3.63g/dl which did not differ ($p>0.05$) from those

of birds in treatment 1 (3.61g/dl) which happens to be the least value. The high value obtained in treatments 3 and 2 could suggest that the quantity and quality of protein made available to the birds was sufficient for their normal performance and function (Alikwe *et al*., 2010).

Table 2. Haematological and Serum-Biochemical Characteristics of Finisher Broiler Birds fed high levels of Lemon Grass Leaf Meal (LGLM)

	Treatments				
Parameters	T1	T2	T3	T4	SEM
*Packed Cell Volume (%)	34.61^{d}	36.77^{a}	36.32^{b}	35.79^{c}	0.25
Haemoglobin (g/l)	8.89^{c}	10.88^{a}	10.91^{a}	9.92^{b}	0.25
Red Blood Cell ($x10^{12}$/l)	3.59^{b}	3.62^{a}	3.71^{a}	3.61^{a}	0.02
*White Blood Cell ($x10^{9}$/l)	7.89^{d}	9.96^{a}	9.41^{b}	9.30^{c}	0.23
Total protein (gldl)	3.61^{b}	3.85^{a}	3.89^{a}	3.63^{b}	0.48
*Albumin (g/dl)	2.34^{d}	2.41^{b}	2.52^{a}	2.39^{c}	0.02
*Creatinine (mg/dl)	0.55^{a}	0.59^{a}	0.59^{a}	0.51^{b}	0.01
*Urea (mg/dl)	7.09^{b}	7.11^{b}	7.22^{a}	7.08^{b}	0.02

^{abcd}Means on the same row with different superscripts are significantly ($p<0.05$) different.
SEM = Standard error of mean

The improvement in the haematological constituents observed in the present study is an indication that the inclusion of lemon grass leaf meal did not show any pathological effect on the bird thus did not cause or create any haematological disorder.

CONCLUSION

Thus it can be concluded from the results obtained that the inclusion of lemon grass leaf meal in the diet of finisher broiler birds up to 3.75% is acceptable by the birds without any negative effect in terms of their health status as reflected in the normal range of acceptable standard of haematological and biochemical profile and percentage mortality values.

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